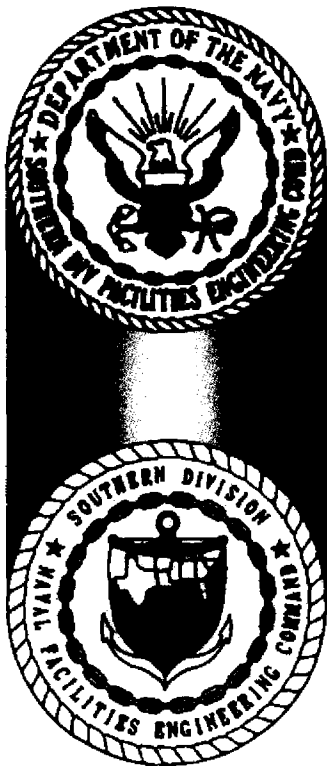


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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT
ADDENDUM CORRECTIVE MEASURES STUDY WORK PLAN COMBINED SOLID WASTE
MANAGEMENT UNIT 53 (SWMU 53) AND AREA OF CONCERN 526 (AOC 526) ZONE E CNC
CHARLESTON SC
3/6/2003
CH2M HILL

RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan SWMU 53 and AOC 526. Zone E



***Charleston Naval Complex
North Charleston, South Carolina***

SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

CH2M-Jones

March 2003

Contract N62467-99-C-0960



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March 6, 2003

Mr. David Scaturo
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum and CMS Work Plan (Revision 1) – SWMU 53 and AOC 526,
Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum and CMS Work Plan (Revision 1) for SWMU 53 and AOC 526 in Zone E of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Sam Naik. Please do not hesitate to contact him at 770/604-9182, extension 255, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Dann Spariosu/USEPA, w/att
Rob Harrell/Navy, w/att
Gary Foster/CH2M HILL, w/att

RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan SWMU 53 and AOC 526, Zone E



***Charleston Naval Complex
North Charleston, South Carolina***

SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

PREPARED BY
CH2M-Jones

March 2003

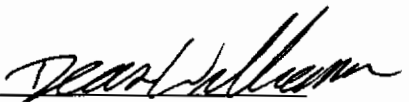
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Contract N62467-99-C-0960
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Certification Page for RFI Report Addendum and CMS Work Plan (Revision 1) – SWMU 53 and AOC 526, Zone E

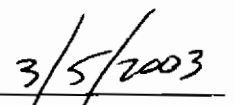
I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.


Date

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29		<i>SWMU 53 and AOC 526, Zone E, Revision 0</i>	

1 Acronyms and Abbreviations

2	AOC	Area of concern
3	AST	Aboveground storage tank
4	BCT	BRAC Cleanup Team
5	BEQ	Benzo[a]pyrene equivalent
6	BRAC	Base Realignment and Closure Act
7	BRC	Background reference concentration
8	CA	Corrective action
9	CMS	Corrective Measures Study
10	CMSWP	Corrective Measures Study Work Plan
11	CNC	Charleston Naval Complex
12	CNSY	Charleston Naval Ship Yard
13	COC	Chemical of concern
14	COPC	Chemical of potential concern
15	DAF	Dilution attenuation factor
16	EnSafe	EnSafe Inc.
17	EPA	U.S. Environmental Protection Agency
18	FRE	Fixed-point risk evaluation
19	HHRA	Human health risk assessment
20	ILCR	Incremental lifetime cancer risk
21	IM	Interim measure
22	HI	Hazard index
23	LUC	Land use control
24	MCL	Maximum contaminant level
25	MCS	Media cleanup standard
26	µg/kg	Microgram per kilogram
27	µg/L	Microgram per liter
28	mg/kg	Milligram per kilogram
29	mg/L	Milligram per liter
30	NAVBASE	Naval Base

1 **Acronyms and Abbreviations, Continued**

2	NFA	No further action
3	NFI	No further investigation
4	OWS	Oil/water separator
5	PCB	Polychlorinated biphenyl
6	RAO	Remedial action objective
7	RBC	Risk-based concentration
8	RCRA	Resource Conservation and Recovery Act
9	RFI	RCRA Facility Investigation
10	RGO	Remedial goal option
11	RI	Remedial investigation
12	SAA	Satellite Accumulation Area
13	SCDHEC	South Carolina Department of Health and Environmental Control
14	SSL	Soil screening level
15	SVOC	Semivolatile organic compound
16	SWMU	Solid waste management unit
17	TDS	Total dissolved solids
18	UCL ₉₅	95-percent upper confidence level
19	UST	Underground storage tank
20	VOC	Volatile organic compound

1.0 Introduction

In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for closure as part of the Defense Base Realignment and Closure Act (BRAC), which regulates closure and transition of property to the community. The Charleston Naval Complex (CNC) was formed as a result of the dis-establishment of the Charleston Naval Shipyard and NAVBASE on April 1, 1996.

Corrective Action (CA) activities are being conducted under the Resource Conservation and Recovery Act (RCRA) with the South Carolina Department of Health and Environmental Control (SCDHEC) as the lead agency for CA activities at the CNC. All RCRA CA activities are performed in accordance with the Final RCRA Part B Permit (Permit No. SC0 170 022 560).

In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to complete the RCRA Facility Investigation (RFI) for Solid Waste Management Unit (SWMU) 53 and Area of Concern (AOC) 526 in Zone E of the CNC. The locations of SWMU 53 and AOC 526 in Zone E are shown in Figure 1-1. Figure 1-2 shows an aerial photograph of SWMU 53 and AOC 526.

1.1 Background

SWMU 53 and AOC 526 consist of two related areas in Building 212, and were therefore investigated together during the RFI. Building 212 is located between Shipbuilding Way and Everglades Drive in Zone E of the CNC. Railroad lines are located approximately 100 feet west of the building.

SWMU 53 consists of the former Satellite Accumulation Area (SAA) 29, which was used as part of the Charleston Naval Ship Yard (CNSY) hazardous waste management system. SAA 29 was used to temporarily store accumulated waste material in 55-gallon drums prior to disposal. The SAA was located outside Building 212 on asphalt surface. The waste material included acids, bases, metals, solvents, petroleum hydrocarbons, and paints. Use of SAA 29 has been discontinued since base closure.

AOC 526 consists of an area that was used for sand-blasting and spray-painting ship components. Two types of metal-based paints were used in the spray-painting process. AOC 526 was used between 1974 and 1993. The unit is located on an asphalt pavement. SWMU 53 and AOC 526 have been cleaned and all accumulated waste material from SAA 29 were removed at the time of the RFI. Building 212 is currently being used as an abrasive sand-blasting booth operated by Metal Trades, Inc. The materials of concern that were identified based on historical operations for SWMU 53 and AOC 526 in the *Final Zone E RFI Work Plan, Revision 1* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995) include acids, metals, solvents, petroleum hydrocarbons, and paints. This area of Zone E is zoned M-2 (industrial land use). The CNC RCRA Permit identified SWMU 53 and AOC 526 as requiring an RFI. The RFI was initially conducted by the Navy/EnSafe Inc. (EnSafe) team, and the *Zone E RFI Report, Revision 0* (EnSafe, 1997) was prepared and submitted during 1997. Regulatory review was conducted on this document and draft responses to the comments from SCDHEC were prepared by the Navy/EnSafe team.

1.2 Purpose of the RFI Report Addendum/CMS Work Plan

The purpose of this RFI Report Addendum/CMS Work Plan (RFIRA/CMSWP) is to document the results of the previous RFI conducted by the Navy/EnSafe team at SWMU 53 and AOC 526. This RFIRA/CMSWP also discusses the findings of previous investigations, existing site conditions, and surrounding area land use.

Section 8.0 of this RFIRA/CMSWP presents a work plan to assess applicable corrective measures to address benzo[a]pyrene equivalents (BEQs) as the chemicals of concern (COCs) that were identified in the site soil for SWMU 53 and AOC 526. The discussion regarding these COCs, and the analysis process used to identify them as COCs, can be found in Section 5.0 of this RFIRA.

Prior to changing the status of any site in the CNC RCRA CA permit, the BRAC Cleanup Team (BCT) agreed that the following issues should be considered:

- Status of the RFI
- Presence of metals (inorganics) in groundwater
- Potential linkage to SWMU 37, Investigated Sanitary Sewers at the CNC
- Potential linkage to AOC 699, Investigated Storm Sewers at the CNC

- Potential linkage of AOC 504, Investigated Railroad Lines at the CNC
 - Potential linkage to surface water bodies (Zone J)
 - Potential contamination associated with oil/water separators (OWSs)
 - Relevance or need for land use controls (LUCs) at the site
- Information regarding these issues is provided in this RFIRA/CMSWP to expedite evaluation of closure of the site.

1.3 Report Organization

This RFIRA/CMSWP consists of the following sections, including this introductory section:

- 1.0 Introduction** – Presents the purpose of the report and background information relating to the RFIRA/CMSWP.
 - 2.0 Summary of RFI Conclusions for SWMU 53 and AOC 526** – Summarizes the conclusions from the RFI investigation and risk evaluation for SWMU 53 and AOC 526 as presented in the *Zone E RFI Report, Revision 0*.
 - 3.0 Interim Measures and UST/AST Removals** – Provides information regarding any interim measures (IMs) or tank removal activities performed at the site.
 - 4.0 Summary of Additional Investigations** – Summarizes information, if any, collected after completion of the *Zone E RFI Report, Revision 0*.
 - 5.0 COPC/COC Refinement** – Provides further evaluation of chemicals of potential concern (COPCs) based on the RFI and additional data used to assess them as COCs.
 - 6.0 Summary of Information Related to Site Closeout Issues** – Discusses the various site closeout issues that the BCT agreed to evaluate prior to site closeout.
 - 7.0 Recommendations** – Provides recommendations for proceeding with a CMS for SWMU 53 and AOC 526.
 - 8.0 CMS Work Plan for SWMU 53 and AOC 526** - Provides a CMSWP for assessing applicable corrective measures to address the COCs identified in the site soil at SWMU 53 and AOC 526.
 - 9.0 References** – Lists the references used in this document.
- Appendix A** contains excerpts from the *Zone E RFI Report, Revision 0*, including a summary of detections of chemicals and a groundwater flow map for the site vicinity.

- 1 **Appendix B** contains a historic railroad location map, with the SWMU 53 and AOC 526 site
- 2 identified.
- 3 **Appendix C** contains CH2M-Jones' responses to SCDHEC comments made regarding the
- 4 *RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Revision 0* (CH2M-Jones, 2002).
- 5 All figures and tables appear at the end of their respective sections.

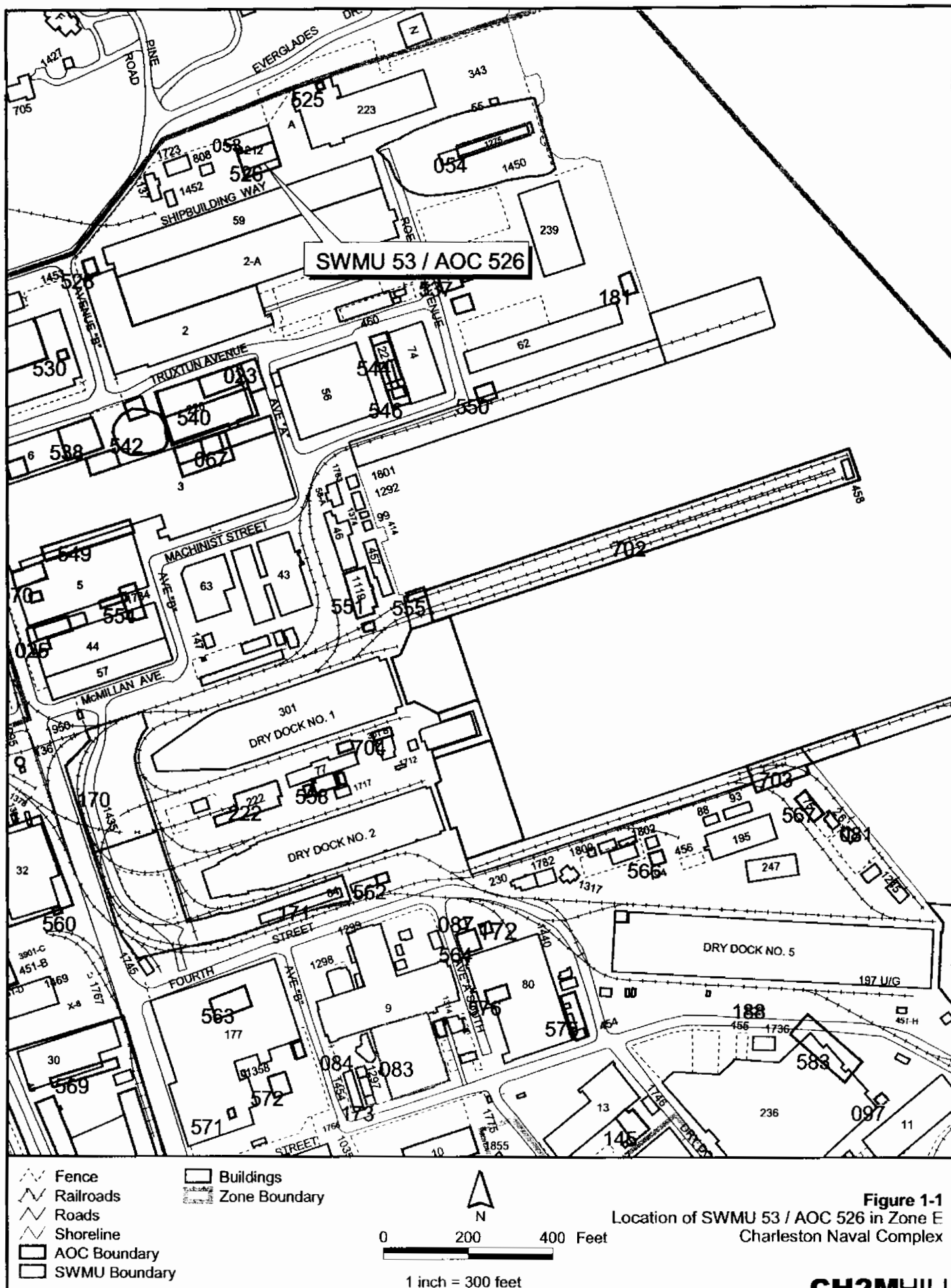
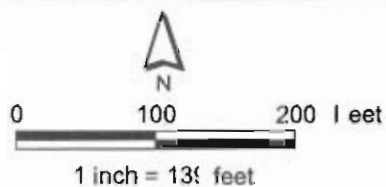




Figure 1.2
Site Map

SWMU 53 and AOC 526, Zone E
Charleston Naval Complex

-  I ence
 Railroads
 Roads - Lines
 AOC Boundary
 SWMU Boundary
 Buildings
-  Zone Boundary



2.0 Summary of RFI Conclusions for SWMU 53 and AOC 526

This section summarizes the results and conclusions from the RFI conducted at SWMU 53 and AOC 526, as reported in the *Zone E RFI Report, Revision 0* (EnSafe, 1997). Figure 2-1 presents the soil and groundwater sampling locations. Appendix A contains excerpts from the RFI report, including a summary of detections of chemicals and their corresponding analytical results, and a groundwater flow map for the site vicinity.

As part of the RFI, soil and groundwater investigations were conducted at SWMU 53 and AOC 526 during 1995-1997. The *Zone E RFI Report, Revision 0* presented the results of these investigations and conclusions concerning contamination and risk, as summarized in the following sections. A further evaluation of the COCs identified at SWMU 53 and AOC 526 is provided in Section 5.0.

2.1 Soil Sampling and Analysis

The RFI soil investigation at SWMU 53 and AOC 526 consisted of two sampling events. Figure 2-1 shows the RFI sample locations at SWMU 53 and AOC 526.

During the first sampling event, surface and subsurface soil samples were collected from sampling locations E053SB001, E053SB002, and E526SB002 through E526SB009. Soil samples were analyzed for organotins, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and cyanide. Three duplicate soil samples were collected and analyzed for an extended list of analytes, including organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, hexavalent chromium, herbicides, and dioxins.

During the second sampling event, surface and subsurface soil samples were collected from sampling locations E053SB003 and E053SB004. Soil samples were analyzed for organotins, VOCs, SVOCs, pesticides, PCBs, metals, and cyanide. Two duplicate soil samples were collected and analyzed for an extended list of analytes, including organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, hexavalent chromium, herbicides, and dioxins.

2.1.1 Surface Soil Results

During the RFI, surface soil detections of organic compounds were evaluated against the U.S. Environmental Protection Agency (EPA) Region III industrial RBCs (with a hazard index [HI]=0.1 for noncarcinogens). Surface soil detections of inorganic compounds were evaluated against the EPA Region III industrial RBCs (HI=0.1 for noncarcinogens) and the Zone E background reference concentrations (BRCs).

Detected concentrations of organic and inorganic compounds for surface soil samples were as follows:

- **Organotins:** Organotins were not detected in surface soil above screening criteria.
- **VOCs:** No VOCs were detected in surface soil above screening criteria.
- **SVOCs:** BEQs were detected in surface soil sample E526SB002 at a concentration of 2.32 milligrams per kilogram (mg/kg), which is above the industrial RBC for benzo[a]pyrene of 0.78 mg/kg.
- **Pesticides:** No pesticides were detected in surface soil above screening criteria.
- **PCBs:** No PCBs were detected in surface soil above screening criteria.
- **Inorganics:** No inorganics were detected in surface soil above screening criteria.
- **Cyanide:** No cyanide was detected in surface soil above laboratory detection limits.
- **Herbicides:** No herbicides were detected in surface soil above laboratory detection limits.
- **Dioxins:** No dioxins were detected in surface soil above the screening criteria.

2.1.2 Subsurface Soil Results

During the RFI, subsurface soil detections of organic compounds were compared with generic soil screening levels (SSLs) (using a dilution attenuation factor [DAF]=10). Subsurface soil detections of inorganic compounds were compared with generic SSLs (using a DAF=10) and the Zone E BRCs.

Detected concentrations of organic and inorganic compounds from subsurface soil samples are as follows:

- **Organotins:** No organotins were detected in subsurface soil above laboratory detection limits.
- **VOCs:** No VOCs were detected in subsurface soil above screening criteria.
- **SVOCs:** BEQs were detected in the subsurface soil sample E053SB002 at a concentration of 10.65 mg/kg.
- **Pesticides:** No pesticides were detected in subsurface soil above screening criteria.
- **PCBs:** No PCBs were detected in subsurface soil above laboratory detection limits.

- **Inorganics:** No inorganics were detected in subsurface soil above screening criteria.
- **Cyanide:** No cyanide was detected in subsurface soil above laboratory detection limits.
- **Herbicides:** No herbicides were detected above laboratory detection limits.
- **Dioxins:** No dioxins were detected above laboratory detection limits.

2.2 Groundwater Sampling and Analysis

Groundwater was sampled during four sampling events at SWMU 53 and AOC 526. The *Zone E RFI Report, Revision 0* presented groundwater data from the first sampling event. Groundwater samples were collected from shallow monitoring wells E053GW001, E526GW001 and E526GW002, and deep monitoring well E526GW01D. The groundwater monitoring well locations are shown in Figure 2-1. Groundwater samples were analyzed for organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, chlorides, sulfates, and total dissolved solids (TDS).

2.2.1 Shallow Groundwater Results

During the RFI, detections in shallow groundwater samples were compared to the EPA Region III tap water RBCs, maximum contaminant levels (MCLs), and the Zone E BRCs for shallow groundwater.

Detected concentrations of organic and inorganic compounds for shallow groundwater samples were as follows:

- **Organotins:** No organotins were detected above laboratory detection limits.
- **VOCs:** No VOCs were detected above screening criteria.
- **SVOCs:** No SVOCs were detected above laboratory detection limits.
- **Pesticides:** No pesticides were detected above laboratory detection limits.
- **PCBs:** No PCBs were detected above laboratory detection limits.
- **Inorganics:** Iron was detected in samples E053GW001, E526GW001 and E526GW002 at concentrations of 9.65 milligrams per liter (mg/L), 1.18 mg/L, and 6.09 mg/L, respectively, above the EPA Region III tap water RBC for iron of 1.1 mg/L. No primary MCL exists for iron, and no shallow groundwater BRC has been established for iron in Zone E.
- **Cyanide:** No cyanide was detected above laboratory detection limits.

2.2.2 Deep Groundwater Results

During the RFI, detections in deep groundwater samples were compared to the EPA Region III tap water RBCs, MCLs, and the Zone E BRCs for deep groundwater. The detected

concentrations of organic and inorganic compounds for deep groundwater samples were as follows:

- **Organotins:** No organotins were detected above laboratory detection limits.
- **VOCs:** No VOCs were detected above laboratory detection limits.
- **SVOCs:** No SVOCs were detected above laboratory detection limits.
- **Pesticides:** No pesticides were detected above laboratory detection limits.
- **PCBs:** No PCBs were detected above laboratory detection limits.
- **Inorganics:** No inorganics were detected above screening criteria.
- **Cyanide:** No cyanide was detected above laboratory detection limits.

2.3 RFI Human Health Risk Assessment (HHRA)

The *Zone E RFI Report, Revision 0* used a fixed-point risk evaluation (FRE) approach at SWMU 53 and AOC 526. The FRE considered site resident and site worker scenarios during the FRE. The detailed risk assessment for the SWMU 53 and AOC 526 site is presented in Section 10.5.6 of the *Zone E RFI Report, Revision 0*.

2.3.1 Soils

The HHRA did not identify any COCs for surface soil or subsurface soil for SMWU 53 and AOC 526.

2.3.2 Groundwater

The HHRA did not identify any COCs for shallow or deep groundwater for SWMU 53 and AOC 526.

2.4 RFI Conclusions and Recommendations

The *Zone E RFI Report, Revision 0* concluded that No Further Action (NFA) was appropriate at SWMU 53 and AOC 526.

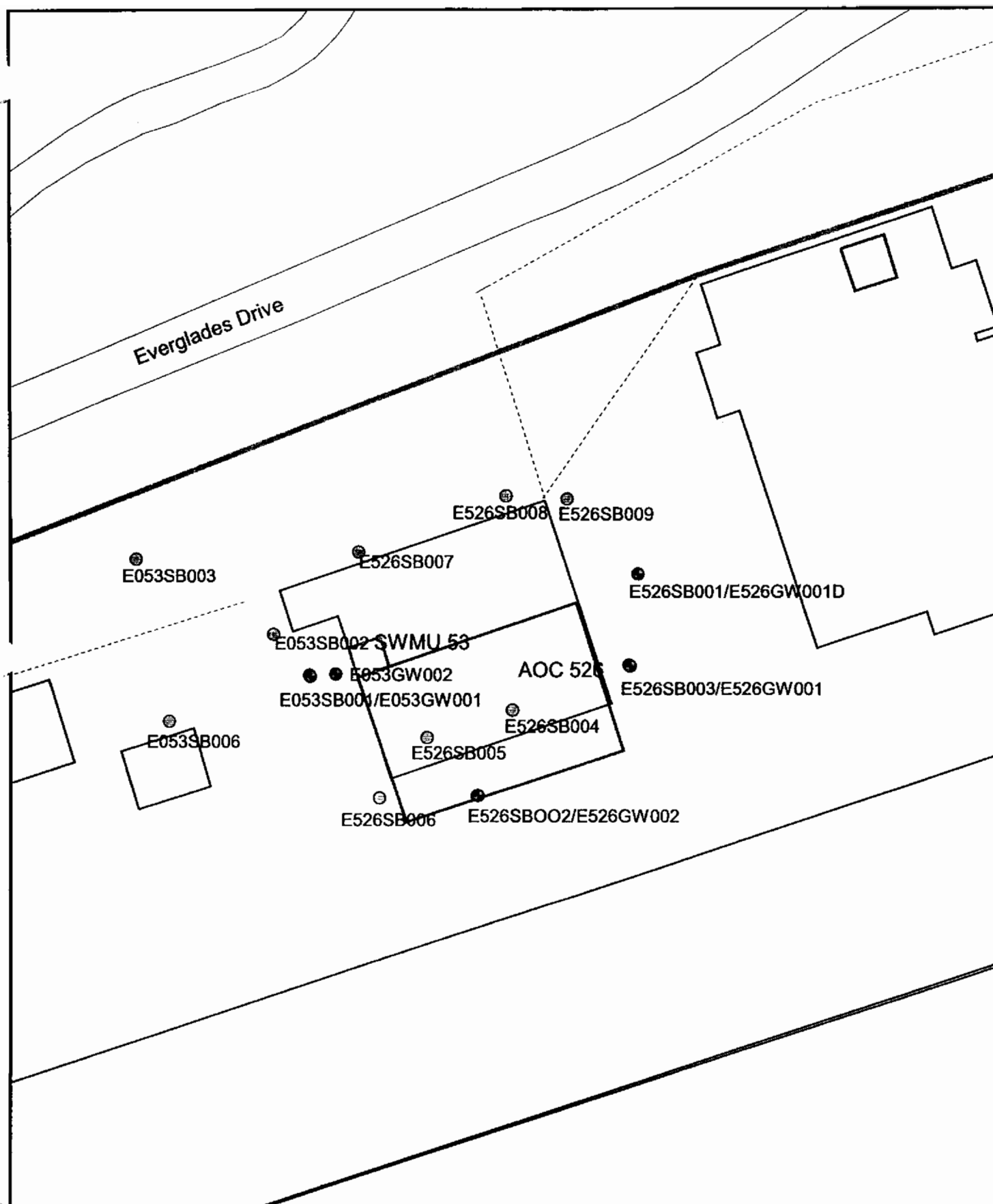
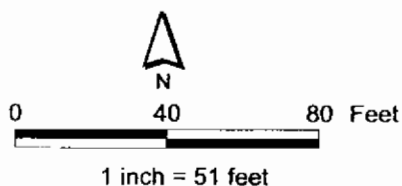


Figure 2-1
RFI Sampling Locations
SWMU 53 and AOC 526, Zone E
Charleston Naval Complex

- Groundwater Sampling Location
- ⊙ Soil Sampling Locations
- - - Fence
- - - Railroads
- - - Roads - Lines
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary



3.0 Interim Measures and UST/AST Removals at SWMU 53 and AOC 526

3.1 Interim Measures

There were no IMs conducted at SWMU 53 and AOC 526.

3.2 UST/AST Removals

There is no indication that underground storage tanks (USTs) or aboveground storage tanks (ASTs) were located at SWMU 53 and AOC 526.

1 **4.0 Summary of Additional Investigations**

- 2 No additional investigations have been conducted at SWMU 53 and AOC 526 since the RFI
- 3 was completed by the Navy/EnSafe team during 1995-1997.

1 5.0 COPC/COC Refinement

2 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) did not identify any COCs for SWMU 53
3 and AOC 526 under the future industrial land use scenario. Therefore, this site is suitable
4 immediately for continued industrial land use, with LUCs to prevent unrestricted (i.e.,
5 residential) land use.

6 During review of the data, CH2M-Jones noted a few exceedances of chemicals that were
7 above the EPA Region III residential RBC screening criteria; these exceedances are
8 discussed below to expedite site closeout. In addition, the BCT has agreed to rescreen VOC
9 detections concentrations in soil against generic SSLs based on a DAF of 1. Two VOCs,
10 acetone and carbon disulfide, were detected in soil samples from the site. Table 5-1 shows
11 their detected concentrations. These VOC detections did not exceed their respective SSLs
12 with a DAF=1. Therefore, no further screening for VOCs in soil is necessary.

13 5.1 Surface Soil COCs

14 5.1.1 BEQs

15 BEQs were not identified as a surface soil COC in the *Zone E RFI Report, Revision 0* under the
16 industrial land use scenario. A single BEQ exceedance of the sitewide reference
17 concentration in surface soil (1,304 micrograms per kilogram [$\mu\text{g}/\text{kg}$]) was noted in sample
18 E526SB002. At this location, BEQs were detected in surface soil at 2,218.5 $\mu\text{g}/\text{kg}$, which is
19 above the EPA Region III residential RBC (HI=0.1) for benzo[a]pyrene of 0.087 $\mu\text{g}/\text{kg}$. BEQs
20 were not detected in the subsurface soil sample above the CNC subsurface soil BEQ
21 sitewide reference concentration of 1,400 $\mu\text{g}/\text{kg}$ at this location, indicating that BEQs are
22 not impacting the subsurface soils at this location. Additionally, groundwater samples from
23 well E526GW002 advanced at this location did not show detections for BEQ compounds
24 above laboratory detection limits, indicating that the surface soil BEQ detection at this
25 location is not a threat to groundwater. However, due to the single exceedance of the CNC
26 sitewide reference concentration, BEQs will be considered a surface soil COC for both the
27 unrestricted and industrial land use scenarios at the site.

28 5.1.2 Mercury

29 Mercury was not identified as a surface soil COC in the *Zone E RFI Report, Revision 0* under
30 the industrial land use scenario. A single mercury exceedance in surface soil above the EPA

Region III residential RBC (HI=0.1) was noted at the surface soil sample from E053SB001 at a concentration of 8.1 mg/kg. This value was also above the Zone E maximum surface soil background mercury concentration of 2.7 mg/kg. The UCL₉₅ (by the non-parametric Bootstrap method) for surface soil mercury at the site was estimated to be 1.89 mg/kg (see Table 5-2), which is lower than the residential RBC of 2.3 mg/kg (HI=0.1) and Zone E maximum background mercury concentration of 2.7 mg/kg. This elevated mercury detection was found in the soils under the asphalt pavement. Therefore, direct exposure to these soils is limited. There were no exceedances of screening criteria for mercury in subsurface soils at this site.

Because the UCL₉₅ estimate for surface soil mercury is below the residential RBC (HI=0.1), which represents a conservative criterion, and is well below the residential RBC of 23 mg/kg (HI=1.0), as well as the Zone E maximum mercury background concentration of 2.7 mg/kg, mercury is not considered a COC for the unrestricted land use scenario.

5.2 Subsurface Soil COCs

5.2.1 BEQs

One subsurface soil sample at E053SB002 showed a BEQ detection of 10,653.7 µg/kg, which is above the CNC BEQ sitewide reference concentration of 1,400 µg/kg for subsurface soils. Groundwater samples from wells E053GW001 and E053GW002, which are located within 10 to 20 feet of this boring, did not have detectable levels of BEQs, indicating that leaching of BEQs is not a concern.

The SWMU 53/AOC 526 site is located within Zone E in an area that is paved with asphalt material. The elevated BEQ detections in the sample from E053SB002 could be a result of the BEQs present in asphalt. As shown in Figure B-1, historic railroad lines are present on the south and west side of the site, which could be contributing to the elevated BEQ detections in this subsurface soil sample.

5.3 COC Summary

Due to the exceedances mentioned above of the sitewide reference concentrations, BEQs are retained as a COC for surface and subsurface soils for both the industrial and unrestricted (i.e., residential) future land use scenarios at this site.

TABLE 5-1
 Detected Concentrations of VOCs Acetone and Carbon Disulfide in Soil
RFI Report Addendum and CMS Work Plan, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC (HI=0.1)	SSL (DAF=1)	Zone E Background Range of Concentrations
Acetone (Surface Soil)							
	E053SB002	E053SB00201	0.15	J	780	0.8	NA
	E526SB007	E526SB00702	0.12	J			
Carbon Disulfide (Subsurface Soil)							
	E053SB002	E053SB00202	0.005	J	780	2	NA

J Indicates an estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.

NA Not Applicable

TABLE 5-2

COPCs Detected in Soil at SWMU 53 and AOC 526

RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration	Units	Qualifier	Date Collected	EPA Region III Residential RBC(HI=0.1)	SSL (DAF=1)	Zone E Background Range of Concentrations
BEQs	(Surface Soil)								
	E053SB001	053SB00101	797.295	µg/kg	U	11/16/1995	0.087	NA	1,304 ^a
	E053SB002	053SB00201	831.96	µg/kg	=	11/16/1995			
	E053SB003	053SB00301b	392.87	µg/kg	U	11/16/1995			
	E053SB004	053SB00401	415.98	µg/kg	U	11/16/1995			
	E526SB002	526SB00201	2,218.5	µg/kg	=	11/16/1995			
	E526SB003	526SB00301	924.4	µg/kg	U	11/16/1995			
	E526SB004	526SB00401	820.405	µg/kg	U	11/16/1995			
	E526SB005	526SB00501	831.96	µg/kg	U	11/16/1995			
	E526SB006	526SB00601	759.665	µg/kg	U	11/16/1995			
	E526SB007	526SB00701	901.29	µg/kg	=	11/16/1995			
	E526SB008	526SB00801	687.84	µg/kg	U	11/16/1995			
	E526SB009	526SB00901	831.96	µg/kg	U	11/16/1995			
		Site Average	867.8						
BEQs	(Subsurface Soil)								
	E053SB001	E053SB00102	866.625	µg/kg	U	11/16/1995	0.087	NA	1,400 ^a
	E053SB002	E053SB00202	10,653.7	µg/kg	=	11/16/1995			
	E053SB003	E053SB00302B	404.425	µg/kg	U	11/16/1995			

TABLE 5-2
 COPCs Detected in Soil at SWMU 53 and AOC 526
 RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration	Units	Qualifier	Date Collected	EPA Region III Residential RBC(HI=0.1)	SSL (DAF=1)	Zone E Background Range of Concentrations
BEQs	(Subsurface Soil)								
	E053SB004	E053SB00402	473.755	µg/kg	U	11/16/1995	0.087	NA	1,400 ^a
	E526SB002	E526SB00202	812.865	µg/kg	=	11/16/1995			
	E526SB003	E526SB00302	982.175	µg/kg	U	11/16/1995			
	E526SB004	E526SB00402	855.07	µg/kg	U	11/16/1995			
	E526SB005	E526SB00502	855.07	µg/kg	U	11/16/1995			
	E526SB006	E526SB00602	820.405	µg/kg	U	11/16/1995			
	E526SB007	E526SB00702	1183.24	µg/kg	=	11/16/1995			
	E526SB008	E526SB00802	878.18	µg/kg	U	11/16/1995			
	E526SB009	E526SB00902	1,016.84	µg/kg	U	11/16/1995			
Mercury	(Surface Soil)								
	053SB001	053SB00101	8.1	mg/kg	J	11/16/1995	2.3	1	0.03 - 2.7
	053SB003	053SB00301b	0.7	mg/kg	=	11/16/1995			
	053SB002	053SB00201	0.31	mg/kg	J	11/16/1995			
	053SB004	053SB00401	0.28	mg/kg	=	11/16/1995			
	526SB009	526SB00901	0.06	mg/kg	=	11/16/1995			
	526SB008	526SB00801	0.1	mg/kg	J	11/16/1995			

TABLE 5-2
 COPCs Detected in Soil at SWMU 53 and AOC 526
RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration	Units	Qualifier	Date Collected	EPA Region III Residential RBC(HI=0.1)	SSL (DAF=1)	Zone E Background Range of Concentrations
Mercury	(Surface Soil)								
	526SB007	526SB00701	0.1	mg/kg	J	11/16/1995	2.3	1	0.03 - 2.7
	526SB004	526SB00401	0.09	mg/kg	J	11/16/1995			
	526SB005	526SB00501	0.22	mg/kg	J	11/16/1995			
	526SB003	526SB00301	0.11	mg/kg	=	11/16/1995			
	526SB002	526SB00201	0.19	mg/kg	J	11/16/1995			
	526SB006	526SB00601	0.3	mg/kg	J	11/16/1995			
Site Average			0.88						
Site UCL95% =			1.89						(Based on non-parametric - Bootstrap method)
Site UCL95% =			0.09						(Based on non-parametric method)

Values are presented in units of micrograms per kilogram ($\mu\text{g/kg}$) or milligrams per kilogram (mg/kg).

Concentrations outlined within the table and in bold represent exceedances of the appropriate screening criterion(a).

^aSitewide reference concentrations for BEQs in surface and subsurface soil from the *Background PAHs Study: Technical Information for Development of Background BEQ Values* (CH2M-Jones, February 2001).

- J Indicates an estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.
- = Indicates that the analyte was detected at the concentration shown.
- U Indicates that the analyte was not detected.
- NA Not applicable/not available.

1 **6.0 Summary of Information Related to Site** 2 **Closeout Issues**

3 **6.1 RFI Status**

4 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/ AOCs within Zone E of
5 the CNC, including SWMU 53 and AOC 526. The RFI report did not identify any COCs for
6 soil or groundwater at SWMU 53 and AOC 526. Additional evaluation of the RFI data
7 identified BEQs as a COC for surface and subsurface soils. With the submission of this
8 RFIRA/CMSWP, the RFI is considered complete.

9 The remaining subsections address the issues that the BCT agreed to evaluate prior to site
10 closeout. Although an NFA designation is not being requested, these issues are presented to
11 facilitate decision-making at the site.

12 **6.2 Presence of Inorganics in Groundwater**

13 For the purpose of site closeout documentation, the inorganics in groundwater issue refers
14 to the detection of several metals (primarily arsenic, thallium, and antimony) in
15 groundwater at concentrations above the applicable MCL, preceded or followed by
16 detections of these same metals below the MCL or below the practicable quantitation limit.

17 Arsenic was detected in shallow groundwater, but the detections did not exceed its MCL.
18 Antimony was not detected above laboratory detection limits. Thallium was only detected
19 once above its MCL in the third sampling event, but was not detected above its laboratory
20 detection limit during preceding and succeeding sampling events and was not detected
21 above the maximum Zone E background thallium concentration (26 µg/L) in shallow
22 groundwater. There are no data suggesting that there was any impact to groundwater from
23 site-related activities at SWMU 53 and AOC 526. Therefore, further evaluation of this issue
24 is not warranted.

25 **6.3 Potential Linkage to SWMU 37, Investigated Sanitary** 26 **Sewers at the CNC**

27 There are no data suggesting that there was an impact to the sanitary sewers from SWMU
28 53 and AOC 526. Therefore, further evaluation of this issue is not warranted.

6.4 Potential Linkage to AOC 699, Investigated Storm Sewers at the CNC

The SWMU 53/AOC 526 site does not have any direct connection to the storm sewer system. Additionally, soils investigated at this site remain under paved areas, thereby preventing contact with overland runoff reaching storm drains. Therefore, there is no linkage to storm sewers from this site.

It should also be noted that the Navy/EnSafe team is currently performing an evaluation of whether there is any contamination discharging from the storm sewers at the CNC. They have conducted wet-weather sampling of stormwater and have analyzed the collected stormwater for a wide range of analytes. In the event that this evaluation indicates a discharge of significant contamination that may be related to this site, any potential linkage will be reassessed at that time. Based on these observations, further evaluation of this issue is not warranted.

6.5 Potential Linkage to AOC 504, Investigated Railroad Lines at the CNC

The nearest railroad line to SWMU 53 and AOC 526 is approximately 100 feet to the southeast of Building 212. There are no known connections between SWMU 53 and AOC 526 and the investigated railroad lines in Zone E at the CNC. Therefore, further evaluation of this issue is not warranted.

6.6 Potential Migration Pathways to Surface Water Bodies at the CNC

The nearest surface water body to SWMU 53 and AOC 526 is the Cooper River, which lies approximately 120 feet east of the site. The only potential migration pathway from the site to surface water is by overland flow from stormwater runoff. The entire site is covered with buildings and pavement, which eliminates contact of surface soil with stormwater. Similarly, runoff directed to the storm sewer system, which discharges to the Cooper River, does not contact the surface soil. Therefore, further evaluation of potential migration of contaminated groundwater to a surface water body is not warranted.

1 **6.7 Potential Contamination in Oil/Water Separators (OWSs)**

2 There are no OWSs associated with SWMU 53 and AOC 526. In addition, there is no
3 reference to an OWS at the site in the *Oil Water Separator Data* report, which was issued by
4 the Department of the Navy, September 2000. Therefore, further evaluation of this issue is
5 not warranted.

6 **6.8 Land Use Controls (LUCs)**

7 The Navy/CH2M-Jones team is proposing that this site be used only for industrial land use.
8 LUCs restricting the land use to industrial use only will be implemented by the BCT. The
9 LUC issue will be addressed in the CMSWP and the CMS Report for SWMU 53 and AOC
10 526.

7.0 Recommendations

SWMU 53 consists of the former SAA 29, which was used as part of the CNSY hazardous waste management system. SAA 29 was used to temporarily store accumulated waste material in 55-gallon drums prior to their disposal. Waste material included acids, bases, metals, solvents, petroleum hydrocarbons, and paints. The use of SAA 29 has been discontinued since base closure.

AOC 526 consists of an area that was used for sand blasting and spray painting ship components. Two types of metal-based paints were used in the spray painting process. AOC 526 was used between 1974 and 1993. SWMU 53 and AOC 526 have been cleaned and all accumulated waste material from SAA 29 has been removed prior to the RFI.

The CNC RCRA Permit identified SWMU 53 and AOC 526 as requiring an RFI.

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified no COCs in surface or subsurface soil at SWMU 53 and AOC 526, based on the industrial land use scenario. The RFI report recommended no corrective measures be performed at the site. However, further evaluation of site constituents identified BEQs as COCs in surface and subsurface soil under the industrial and unrestricted future land use scenarios.

A focused CMS is recommended for this site to evaluate potential remedies for addressing BEQs in site surface and subsurface soil. Section 8.0 presents this focused CMSWP. Should a future property owner decide to use the property for unrestricted (i.e., residential) land use, the future owner may make a demonstration that the property is suitable for the proposed use or perform the necessary additional investigations and remediation, as necessary, for that proposed use.

8.0 CMS Work Plan for SWMU 53 and AOC 526

BEQs were identified as COCs in surface and subsurface soil for the industrial and unrestricted (i.e., residential) future land use scenarios at SWMU 53 and AOC 526. A BEQ concentration of 2,218 $\mu\text{g}/\text{kg}$ at one surface soil sample from location E526SB002 exceeded the CNC BEQ sitewide reference concentration for surface soils of 1,304 $\mu\text{g}/\text{kg}$. BEQs were also detected at a concentration of 10.65 mg/kg in the subsurface soil sample from location E053SB002, which is above the CNC BEQ sitewide reference concentration for subsurface soils of 1,400 $\mu\text{g}/\text{kg}$. Therefore, a CMS will be conducted to evaluate potential corrective measures and to identify an appropriate remedy for the site.

This section presents a focused CMSWP for BEQs in surface and subsurface soil at SWMU 53 and AOC 526. Media cleanup standards (MCSs) are identified for COCs, and potential remedies that should be evaluated are also presented.

8.1 Remedial Action Objectives

Remedial action objectives (RAOs) are medium-specific goals that the remedial actions are designed to accomplish in order to protect human health and the environment by preventing or reducing exposures under current and future land use conditions. The RAOs identified for the surface and subsurface soil at SWMU 53 and AOC 526 are to prevent ingestion and direct/dermal contact with soil containing COCs at unacceptable levels. No remedial actions are required for groundwater at SWMU 53 and AOC 526.

8.2 Remedial Goal Options and Media Cleanup Standards

Throughout the process of remediating a hazardous waste site, a risk manager uses a progression of increasingly acceptable site-specific media levels in considering remedial alternatives. Under the RCRA program, remedial goal options (RGOs) and MCSs are developed at the end of the risk assessment in the RFI/Remedial Investigation (RI) programs, before completion of the CMS.

RGOs can be based on a variety of criteria, such as specific incremental lifetime cancer risk (ILCR) levels (e.g., 1E-04, 1E-05, or 1E-06), HI levels (e.g., 0.1, 1.0, 3.0), or site background concentrations. For a particular RGO, specific MCSs can be determined as target concentration values. Achieving these MCSs is accepted as demonstrating that RGOs and RAOs have been achieved. Achieving these goals should promote the protection of human

1 health and the environment, while achieving compliance with applicable state and federal
2 standards.

3 The exposure medium of concern for SWMU 53 and AOC 526 is surface and subsurface soil
4 impacted by BEQs. Because the SWMU 53 and AOC 526 area is located within a highly
5 developed area of the CNC, and there are no surface water bodies in the immediate vicinity
6 of the site, ecological exposures were not considered applicable for evaluation.

7 The general vicinity around SWMU 53 and AOC 526 within Zone E has elevated
8 concentrations of BEQs, making it unfit for future unrestricted land use purposes. For BEQs,
9 the target MCS for surface soil should be the CNC BEQ sitewide reference concentration
10 developed by the BCT of 1.304 mg/kg. The target MCS for BEQs in subsurface soil should
11 the CNC BEQ sitewide reference concentration of 1.4 mg/kg. An MCS will be met if the site
12 statistical estimates of concentrations are similar to the background statistical estimates. For
13 point comparisons between site and background levels, site concentration ranges may be
14 compared with the ranges of background concentrations. Other potential RGOs, such as the
15 1E-06 ILCR, were considered but regarded as not applicable for BEQs because the site
16 background concentrations of BEQs are significantly greater than this level.

17 **8.3 Potential Remedies to Evaluate**

18 Because of the small size of this site and the relatively small quantity of impacted surface
19 soil, the list of practicable remedial alternatives for this site is limited. Because this area of
20 Zone E is currently heavily industrialized, and industrial use is expected to continue in all
21 of Zone E, only LUCs are being considered as a presumptive remedy to be evaluated as part
22 of the CMS.

23 **8.4 Focused CMS Approach**

24 The focused CMS will consist of the following tasks that will be performed in the order
25 presented below:

- 26 1. The corrective measure alternative described above will be screened using several
27 criteria and decision factors.
- 28 2. The CMS and preferred corrective measure alternative will be documented in the CMS
29 report.

8.5 Approach to Evaluating Corrective Measure Alternatives

According to the RCRA permit issued by SCDHEC (SCDHEC, 1998), the alternatives will be evaluated with the following five standards:

1. Protecting human health and the environment.
2. Attaining media cleanup standards (RGOs).
3. Controlling the source of releases to minimize future releases that may pose a threat to human health and the environment.
4. Complying with applicable standards for the management of wastes generated by remedial activities.
5. Other factors include (a) long-term reliability and effectiveness; (b) reduction in toxicity, mobility, or volume of wastes; (c) short-term effectiveness; (d) implementability; and (e) cost.

Each of the five criteria is defined in more detail below:

- 1. Protecting human health and the environment.** The alternatives will be evaluated on the basis of their ability to protect human health and the environment. The ability of an alternative to achieve this criterion may or may not be independent of its ability to achieve the other four standards. For example, an alternative may be protective of human health, but may not be able to attain the MCSs if the MCSs are not directly tied to protecting human health.
- 2. Attaining media cleanup standards (RGOs).** The alternatives will be evaluated on the basis of their ability to achieve the RGOs defined in this CMS Work Plan. Another aspect of this criterion is the timeframe to achieve the RGOs. Estimates of the timeframe for the alternatives to achieve RGOs will be provided.
- 3. Controlling the source of releases.** This criterion deals with the control of releases of contamination from the source (the area in which the contamination originated).
- 4. Complying with applicable standards for management of wastes.** This criterion deals with the management of wastes derived from implementing the alternatives, for example, treatment or disposal of excavated material. The soil removal alternative will be designed to comply with all applicable standards for management of remediation wastes. Consequently, this criterion will not be explicitly included in the detailed evaluation presented in the CMS but will be part of a work plan specific to the removal action should a removal action become the chosen alternative.

5. **Other factors.** Five other factors are to be considered if an alternative is found to meet the four criteria described above. These other factors are as follows:

a. Long-term reliability and effectiveness

The two alternatives will be evaluated on the basis of their reliability, and the potential impact should the chosen alternative fail. In other words, a qualitative assessment will be made as to the chance of the alternative's failure and the consequences of that failure.

b. Reduction in the toxicity, mobility, or volume of wastes

Alternatives with technologies that reduce the toxicity, mobility, or volume of the contamination will be generally favored over those that do not. Consequently, a qualitative assessment of this factor will be performed for each alternative.

c. Short-term effectiveness

Alternatives will be evaluated on the basis of the risk they create during the implementation of the remedy. Factors that may be considered include fire, explosion, and exposure of workers to hazardous substances.

d. Implementability

The alternatives will be evaluated for their implementability by considering any difficulties associated with conducting the alternatives (such as the construction disturbances they may create), operation of the alternatives, and the availability of equipment and resources to implement the technologies comprising the alternatives.

e. Cost

A net present value of each alternative will be developed. These cost estimates will be used for the relative evaluation of the alternatives, not to bid or budget the work. The estimates will be based on information available at the time of the CMS and on a conceptual design of the alternative. They will be "order-of-magnitude" estimates with a generally expected accuracy of -50 percent to +50 percent for the scope of action described for each alternative. The estimates will be categorized into capital costs and operations and maintenance costs for each alternative.

In addition to the criteria described above, the alternative will be evaluated for its ability to achieve all contractual obligations of CH2M-Jones and the Navy.

1 **8.6 Focused CMS Report**

2 A focused CMS Report will be prepared to present the identification, development, and
3 evaluation of the potential corrective measure for SWMU 53 and AOC 526. A proposed
4 outline of the report, as shown in Table 8-1, provides an example of the report format and
5 content.

TABLE 8-1

Outline of Focused CMS Report for SWMU 53 and AOC 526

RFI Report Addendum and CMS Work Plan, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Section No.	Section Title
1.0	Introduction
1.1	Corrective Measures Study Purpose and Scope
1.2	Report Organization
1.3	Background Information
1.3.1	Facility Description
1.3.2	Site History and Background
1.3.2.1	Nature and Extent of Contamination
1.3.2.2	Summary of Risk Assessment
2.0	Remedial Goal Objectives
3.0	Detailed Analysis of Focused Alternative
3.1	Approach
3.2	Evaluation Criteria
3.3	Description of Alternative
3.3.1	Alternative 1: Land Use Controls
3.4	Detailed Analysis of Alternative
3.4.1	Analysis of Alternative 1
3.5	Comparative Analysis of Alternatives
4.0	Recommended Remedial Alternative
5.0	References
Appendix A	Corrective Measure Alternative Cost Estimate^b
List of Tables	
List of Figures	

^a Additional alternatives will be analyzed as found necessary.

^b Additional appendices will be added, if necessary.

9.0 References

- 2 EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston*. 1997.
- 3 EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, NAVBASE Charleston*. July
- 4 1995.
- 5 EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Revision 1, NAVBASE Charleston*.
- 6 June 1995.
- 7 CH2M-Jones. *Technical Memorandum: A Summary of Inorganic Chemical Concentrations in*
- 8 *Background Soil and Groundwater at the CNC*. 2001.
- 9 South Carolina Department of Health and Environmental Control, *Final RCRA Part B*
- 10 *Permit No. SC0 170 022 560*.

Table 10.5.1.2
SWMU 53 and AOC 526
Second Round Soil Sampling Summary

Interval	Samples Proposed	Samples Collected	Analyses Proposed	Analyses Collected	Deviations
Lower	2	2	Standard Suite ^a , organotins	Standard Suite ^a , organotins	None

Note:

a = Standard Suite includes VOCs, SVOCs, pesticides/PCBs, metals, and cyanide

10.5.2 Nature of Contamination in Soil

Organic compound analytical results for soil are summarized in Table 10.5.2.1. Inorganic analytical results for soil are summarized in Table 10.5.2.2. Appendix H contains the complete data report for all samples collected in Zone E.

Table 10.5.2.1
SWMU 53 and AOC 526
Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
VOCs ($\mu\text{g/kg}$)						
Acetone	Upper	2/12	120 - 150	135	20,000,000	0
Carbon disulfide	Lower	1/12	5.00	5.00	NA	NA
SVOCs ($\mu\text{g/kg}$)						
Acenaphthylene	Upper	1/12	200	200	8,200,000	0
Anthracene	Upper	1/12	230	230	61,000,000	0
	Lower	1/12	1,100	1,100	NA	NA
Benzo(g,h,i)perylene	Upper	4/12	170 - 1,600	553	8,200,000	0
	Lower	3/12	150 - 5,800	2,080	8,200,000	0
Di-n-butylphthalate	Upper	1/12	93.0	93.0	20,000,000	0
	Lower	1/12	110	110	NA	NA

Table 10.5.2.1
SWMU 53 and AOC 526
Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
SVOCs ($\mu\text{g}/\text{kg}$)						
Fluoranthene	Upper	3/12	120 - 780	347	8,200,000	0
	Lower	3/12	200 - 12,000	4,170	NA	NA
Phenanthrene	Upper	1/12	170	170	8,200,000	0
	Lower	2/12	97.0 - 4,500	2,300	NA	NA
Pyrene	Upper	4/12	180 - 810	358	6,100,000	0
	Lower	3/12	240 - 14,000	4860	NA	NA
SVOCs (B(a)P Equivalents) ($\mu\text{g}/\text{kg}$)						
B(a)P Equiv.	Upper	4/12	323 - 2,320	837	780	1
	Lower	4/12	28.2 - 10,600	2,710	NA	NA
Benzo(a)anthracene	Upper	3/12	130 - 700	323	7,800	0
	Lower	3/12	120 - 5,500	1,930	NA	NA
Benzo(b)fluoranthene	Upper	4/12	300 - 1,200	590	7,800	0
	Lower	3/12	150 - 260	193	NA	NA
Benzo(k)fluoranthene	Upper	4/12	230 - 2,500	868	78,000	0
	Lower	4/12	110 - 7,800	2,060	NA	NA
Benzo(a)pyrene	Upper	4/12	210 - 1,300	513	780	1
	Lower	2/12	160 - 6,500	3,330	NA	NA
Chrysene	Upper	3/12	200 - 1,000	480	780,000	0
	Lower	3/12	140 - 5,700	2,010	NA	NA
Dibenz(a,h)anthracene	Upper	2/12	79.0 - 700	390	780	0
	Lower	1/12	3,000	3,000	NA	NA
Indeno(1,2,3-cd)pyrene	Upper	4/12	130 - 1,000	378	7,800	0
	Lower	3/12	110 - 4,400	1,560	NA	NA
Pesticides/PCBs ($\mu\text{g}/\text{kg}$)						
delta-BHC	Lower	2/12	3.90 - 5.40	4.65	NA	NA

Draft Zone E RCRA Facility Investigation Report
NAVBASE Charleston
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Table 10.5.2.1
SWMU 53 and AOC 526
Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
Pesticides/PCBs ($\mu\text{g/kg}$)						
alpha-Chlordane	Upper	1/12	1.70	1.70	4,400	0
gamma-Chlordane	Upper	2/12	2.30 - 3.40	2.85	4,400	0
4,4'-DDD	Upper	4/12	3.00 - 7.60	4.83	24,000	0
4,4'-DDE	Upper	7/12	3.20 - 140	33.9	17,000	0
	Lower	2/12	8.60 - 12.0	10.3	NA	NA
4,4'-DDT	Upper	6/12	4.50 - 58.0	25.1	17,000	0
	Lower	1/12	11.0	11.0	NA	NA
Endrin aldehyde	Upper	1/12	3.20	3.20	61,000	0
	Lower	1/12	3.50	3.50	NA	NA
Heptachlor	Upper	2/12	1.60 - 2.00	1.80	1,300	0
	Lower	2/12	2.20	2.20	NA	NA
Methoxychlor	Lower	2/12	32.0 - 150	91.0	NA	NA
Aroclor-1260	Upper	1/12	55.0	55.0	740	0
Dioxins (ng/kg)						
Dioxin Equiv.	Upper	4/4	0.575 - 8.49	2.97	1,000	0
	Lower	1/1	0.159	0.159	NA	NA
1234678-HpCDD	Upper	4/4	1.28 - 257	87.7	NA	NA
	Lower	1/1	5.72	5.72	NA	NA
1234678-HpCDF	Upper	4/4	1.84 - 126	43.6	NA	NA
	Lower	1/1	4.29	4.29	NA	NA
123678-HxCDD	Upper	1/4	7.43	7.43	NA	NA
123478-HxCDF	Upper	1/4	4.03	4.03	NA	NA
123678-HxCDF	Upper	2/4	6.85 - 14.9	10.9	NA	NA
123789-HxCDD	Upper	1/4	3.96	3.96	NA	NA

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Table 10.5.2.1
SWMU 53 and AOC 526
Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
Dioxins (ng/kg)						
OCDD	Upper	4/4	13.6 - 1,760	611	NA	NA
	Lower	1/1	51.8	51.8	NA	NA
OCDF	Upper	4/4	0.626 - 270	86.2	NA	NA
	Lower	1/1	6.67	6.67	NA	NA
12378-PeCDF	Upper	1/4	2.53	2.53	NA	NA

Notes:

μg/kg = Micrograms per kilogram
ng/kg = Nanograms per kilogram
RBC = Risk-based concentration
NA = No industrial RBC established

Table 10.5.2.2
SWMU 53 and AOC 526
Inorganic Detections for Soil (mg/kg)

Element	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Reference Conc.	Number of Samples Exceeding RBC and RC
Aluminum (Al)	Upper	12/12	1,450 - 6,570	3,480	100,000	26,600	0
	Lower	12/12	721 - 8,950	4,930	NA	41,100	NA
Antimony (Sb)	Upper	7/12	0.610 - 2.60	1.12	82.0	1.77	0
Arsenic (As)	Upper	11/12	2.20 - 10.7	5.88	3.80	23.9	0
	Lower	11/12	1.10 - 8.30	4.15	NA	19.9	NA
Barium (Ba)	Upper	10/12	9.50 - 24.0	17.4	14,000	130	0
	Lower	10/12	10.8 - 26.7	16.7	NA	94.1	NA
Beryllium (Be)	Upper	10/12	0.160 - 0.390	0.243	1.30	1.70	0
	Lower	10/12	0.210 - 0.510	0.316	NA	2.71	NA
Cadmium (Cd)	Upper	8/12	0.0600 - 0.500	0.255	100	1.50	0
	Lower	2/12	0.290 - 0.390	0.340	NA	0.960	NA

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Table 10.5.2.2
SWMU 53 and AOC 526
Inorganic Detections for Soil (mg/kg)

Element	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Reference Conc.	Number of Samples Exceeding RBC and RC
Calcium (Ca)	Upper	12/12	1,810 - 46,100	7,590	NA	NA	NA
	Lower	12/12	672 - 116,000	17,100	NA	NA	NA
Chromium (Cr)	Upper	12/12	4.00 - 193	42.1	1,000	94.6	0
	Lower	12/12	4.80 - 24.3	13.9	NA	75.2	NA
Cobalt (Co)	Upper	12/12	1.000 - 12.3	4.58	12,000	19.0	0
	Lower	12/12	0.650 - 4.80	1.80	NA	14.9	NA
Copper (Cu)	Upper	12/12	6.10 - 42.7	17.7	8,200	66.0	0
	Lower	12/12	0.970 - 26.7	7.61	NA	152	NA
Iron (Fe)	Upper	12/12	2,460 - 12,800	6,480	61,000	NA	0
	Lower	12/12	1,440 - 18,000	6,360	NA	NA	NA
Lead (Pb)	Upper	12/12	11.8 - 105	45.7	1,300	265	0
	Lower	12/12	2.30 - 309	41.1	NA	173	NA
Magnesium (Mg)	Upper	12/12	213 - 4,350	940	NA	NA	NA
	Lower	12/12	130 - 1,920	678	NA	NA	NA
Manganese (Mn)	Upper	12/12	28.2 - 75.5	52.8	4,700	302	0
	Lower	12/12	14.4 - 110	41.2	NA	881	NA
Mercury (Hg)	Upper	12/12	0.0600 - 8.80	0.938	61.0	2.60	0
	Lower	10/12	0.0300 - 0.190	0.0860	NA	1.59	NA
Nickel (Ni)	Upper	12/12	2.40 - 49.4	9.74	4,100	77.1	0
	Lower	12/12	1.10 - 9.30	3.28	NA	57.0	NA
Potassium (K)	Upper	4/12	278 - 735	475	NA	NA	NA
	Lower	4/12	174 - 1,050	744	NA	NA	NA
Selenium (Se)	Upper	3/12	0.580 - 0.740	0.673	1,000	1.70	0
	Lower	4/12	0.570 - 1.000	0.760	NA	2.40	NA
Silver (Ag)	Upper	3/12	1.40 - 2.20	1.90	1,000	NA	0
	Lower	2/12	0.450 - 0.470	0.460	NA	NA	NA

Table 10.5.2.2
SWMU 53 and AOC 526
Inorganic Detections for Soil (mg/kg)

Element	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Reference Conc.	Number of Samples Exceeding RBC and RC
Sodium (Na)	Upper	1/12	73.6	73.6	NA	NA	NA
	Lower	3/12	92.5 - 326	174	NA	NA	NA
Thallium (Tl)	Upper	2/12	0.590 - 1.10	0.845	16.0	NA	NA
	Lower	2/12	0.670 - 0.960	0.815	NA	NA	NA
Tin (Sn)	Upper	2/12	2.60 - 40.5	21.6	100,000	59.4	0
	Lower	1/12	2.70	2.70	NA	9.23	NA
Vanadium (V)	Upper	12/12	3.90 - 17.5	7.80	1,400	94.3	0
	Lower	12/12	2.20 - 40.7	12.3	NA	155	NA
Zinc (Zn)	Upper	12/12	19.0 - 376	113	61,000	827	0
	Lower	12/12	5.10 - 111	26.5	NA	886	NA

Notes:

mg/kg = Milligrams per kilogram
RBC = Risk-based concentration
RC = Reference concentration
NA = No industrial RBC or RC established

Volatile Organic Compounds in Soil

Two VOCs were detected in soil samples collected at SWMU 53 and AOC 526. Two detections occurred in the upper interval and one in the lower interval. No VOC was detected above its respective industrial RBC in the upper interval or respective SSL in the lower interval.

Semivolatile Organic Compounds in Soil

Fourteen SVOCs were detected in soil samples collected at SWMU 53 and AOC 526. Thirty-nine detections occurred in the upper interval and 32 in the lower interval. One SVOC — benzo(a)pyrene — exceeded its respective industrial RBC in the upper interval. Four SVOCs — benzo(a)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, and chrysene — exceeded their respective SSLs in the lower interval.

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Table 10.5.4.1
SWMU 53 and AOC 526
Organic Compounds Detected in First-Quarter Groundwater ($\mu\text{g/L}$)
Shallow Monitoring Wells

Compound	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	MCL	Number of Samples Exceeding RBC
VOCs						
1,2-Dichloroethene (total)	1/3	1.000	1.000	5.50	70.0	0

Notes:

$\mu\text{g/L}$ = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant level

Table 10.5.4.2
SWMU 53 and AOC 526
Inorganic Detections for First-Quarter Groundwater ($\mu\text{g/L}$)
Shallow Monitoring Wells

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	Reference Conc.	MCL	Number of Samples Exceeding RBC and RC
Aluminum (Al)	2/3	399 - 1,110	755	3,700	2,810	NA	0
Arsenic (As)	1/3	9.40	9.40	0.0450	18.7	50.0	0
Calcium (Ca)	3/3	66,600 - 151,000	112,000	NA	NA	NA	NA
Chromium (Cr)	1/3	2.00	2.00	18.0	12.3	100	0
Cobalt (Co)	1/3	2.20	2.20	220	2.5	NA	0
Copper (Cu)	1/3	3.30	3.30	150	2.7	1,300	0
Iron (Fe)	3/3	1,180 - 9,650	5,640	1,100	NA	NA	3
Lead (Pb)	1/3	3.30	3.30	NA	4.8	15.0*	0
Magnesium (Mg)	3/3	6,020 - 28,000	20,400	NA	NA	NA	NA
Manganese (Mn)	3/3	69.7 - 439	312	84.0	2,560	NA	0
Nickel (Ni)	1/3	2.00	2.00	73.0	15.2	100	0
Potassium (K)	3/3	15,600 - 21,400	18,400	NA	NA	NA	NA

Notes:

$\mu\text{g/L}$ = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant level
 RC = Reference concentration
 NA = No RBC, MCL, or RC established
 * = TTAL

Table 10.5.4.3
SWMU 53 and AOC 526
Inorganic Detections for First-Quarter Groundwater ($\mu\text{g/L}$)
Deep Monitoring Well

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	Reference Conc.	MCL	Number of Samples Exceeding RBC and RC
Calcium (Ca)	1/1	89,600	89,600	NA	NA	NA	NA
Magnesium (Mg)	1/1	12,000	12,000	NA	NA	NA	NA
Manganese (Mn)	1/1	56.7	56.7	84.0	869	NA	0

Notes:

$\mu\text{g/L}$ = Micrograms per liter
RBC = Risk-based concentration
MCL = Maximum contaminant level
RC = Reference concentration
NA = No RBC, MCL, or RC established

Volatile Organic Compounds in Groundwater

Shallow Groundwater

One VOC was detected in shallow groundwater samples collected at SWMU 53 and AOC 526. The sample did not exceed its tap-water RBC or MCL.

Inorganic Elements in Groundwater

Shallow Groundwater

Twelve metals were detected in shallow groundwater samples collected at SWMU 53 and AOC 526. One metal — iron — exceeded its tap-water RBC.

Iron was detected in three of three samples with a range of 1,180 to 9,650 $\mu\text{g/L}$ and a mean of 5,640 $\mu\text{g/L}$. Three samples from wells NBCE053001 (9,650 $\mu\text{g/L}$), NBCE526001 (1,180 $\mu\text{g/L}$), and NBCE526002 (6,090 $\mu\text{g/L}$) exceeded the iron tap-water RBC of 1,100 $\mu\text{g/L}$. No shallow groundwater RC or MCL has been established for iron.

Table 10.5.A
Chemicals Present in Site Samples
SWMU 53; AOC 526 - Surface Soil
NAVBASE - Charleston
Charleston, South Carolina

Parameter	Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration			Units	Number Exceeding		
								Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref
Carcinogenic PAHs														
B(a)P Equiv.	4	12	322.84	2316	837.29	785.74	1848.8	88	780	NA	UG/KG	4	1	
Benzo(a)anthracene	3	12	130	700	323.33	340	800	880	7800	NA	UG/KG			
Benzo(a)pyrene	4	12	210	1300	512.50	340	800	88	780	NA	UG/KG	4	1	
Benzo(b)fluoranthene	4	12	300	1200	590.00	340	800	880	7800	NA	UG/KG	1		
Benzo(k)fluoranthene	4	12	230	2500	867.50	340	800	8800	78000	NA	UG/KG			
Chrysene	3	12	200	1000	480.00	340	800	88000	780000	NA	UG/KG			
Dibenz(a,h)anthracene	2	12	79	700	389.50	340	800	88	780	NA	UG/KG	1		
Indeno(1,2,3-cd)pyrene	4	12	130	1000	377.50	340	800	880	7800	NA	UG/KG	1		
TCDD Equivalents														
Dioxin Equiv.	4	4	0.5749	8.489	2.97	NA	NA	1000	1000	NA	NG/KG			
Inorganics														
Aluminum (Al)	12	12	1450	6570	3481.67	NA	NA	7800	100000	26600	MG/KG			
Antimony (Sb)	7	12	0.61	2.6	1.12	0.43	1.2	3.1	82	1.77	MG/KG			1
Arsenic (As)	11	12	2.2	10.7	5.88	1.8	1.8	0.43	3.8	23.9	MG/KG	11	7	
Barium (Ba)	10	12	9.5	24	17.38	8	10.8	550	14000	130	MG/KG			
Beryllium (Be)	10	12	0.16	0.39	0.24	0.14	0.17	0.15	1.3	1.7	MG/KG	10		
Cadmium (Cd)	8	12	0.06	0.5	0.26	0.11	0.12	3.9	100	1.5	MG/KG			
Calcium (Ca)	12	12	1810	46100	7585.83	NA	NA	NA	NA	NA	MG/KG			
Chromium (Cr)	12	12	4	193	42.11	NA	NA	39	1000	94.6	MG/KG	4		1
Chromium (Hexavalent)	0	4	NA	NA	NA	0.053	0.054	39	1000	NA	MG/KG			
Cobalt (Co)	12	12	1	12.3	4.58	NA	NA	470	12000	19	MG/KG			
Copper (Cu)	12	12	6.1	42.7	17.68	NA	NA	310	8200	66	MG/KG			
Iron (Fe)	12	12	2460	12800	6481.67	NA	NA	NA	NA	NA	MG/KG			
Lead (Pb)	12	12	11.8	105	45.70	NA	NA	400	1300	265	MG/KG			
Magnesium (Mg)	12	12	213	4350	939.58	NA	NA	NA	NA	NA	MG/KG			
Manganese (Mn)	12	12	28.2	75.5	52.79	NA	NA	180	4700	302	MG/KG			
Mercury (Hg)	12	12	0.06	8.8	0.94	NA	NA	2.3	61	2.6	MG/KG	1		1
Nickel (Ni)	12	12	2.4	49.4	9.74	NA	NA	160	4100	77.1	MG/KG			
Potassium (K)	4	12	278	735	474.50	75.9	601	NA	NA	NA	MG/KG			
Selenium (Se)	3	12	0.58	0.74	0.67	0.32	0.58	39	1000	1.7	MG/KG			
Silver (Ag)	3	12	1.4	2.2	1.90	0.2	0.22	39	1000	NA	MG/KG			
Sodium (Na)	1	12	73.6	73.6	73.60	40.8	85	NA	NA	NA	MG/KG			
Thallium (Tl)	2	12	0.59	1.1	0.85	0.36	0.58	0.63	16	2.8	MG/KG	1		
Tin (Sn)	2	12	2.6	40.5	21.55	2.1	4.2	4700	6100	59.4	MG/KG			
Vanadium (V)	12	12	3.9	17.5	7.80	NA	NA	55	1400	94.3	MG/KG			
Zinc (Zn)	12	12	19	376	113.44	NA	NA	2300	61000	827	MG/KG			
Pesticides														
4,4'-DDD	4	12	3	7.6	4.83	2.6	3	2700	24000	NA	UG/KG			
4,4'-DDE	7	12	3.2	140	33.93	2.6	3	1900	17000	NA	UG/KG			
4,4'-DDT	6	12	4.5	58	25.08	2.6	3	1900	17000	NA	UG/KG			
alpha-Chlordane	1	12	1.7	1.7	1.70	1.4	1.6	470	2200	NA	UG/KG			
Aroclor-1260	1	12	55	55	55.00	70	79	83	740	NA	UG/KG			
Endrin aldehyde	1	12	3.2	3.2	3.20	2.6	3	2300	61000	NA	UG/KG			
gamma-Chlordane	2	12	2.3	3.4	2.85	1.4	1.6	470	2200	NA	UG/KG			
Heptachlor	2	12	1.6	2	1.80	1.4	1.5	140	1300	NA	UG/KG			
Semivolatile Organics														
Acenaphthylene	1	12	200	200	200.00	340	800	310000	8200000	NA	UG/KG			
Anthracene	1	12	230	230	230.00	340	800	2300000	61000000	NA	UG/KG			
Benzo(g,h,i)perylene	4	12	170	1600	552.50	340	800	310000	8200000	NA	UG/KG			
Di-n-butylphthalate	1	12	93	93	93.00	340	800	780000	20000000	NA	UG/KG			
Fluoranthene	3	12	120	780	346.67	340	800	310000	8200000	NA	UG/KG			
Phenanthrene	1	12	170	170	170.00	340	800	310000	8200000	NA	UG/KG			
Pyrene	4	12	180	810	357.50	340	800	230000	6100000	NA	UG/KG			
Volatile Organic Compounds														
Acetone	2	12	120	150	135.00	10	38	780000	20000000	NA	UG/KG			

* - Identified as a residential COPC

** - Identified as an industrial COPC

N - Essential nutrient

MG/KG - milligrams per kilogram

UG/KG - micrograms per kilogram

NG/KG - nanograms per kilogram

SQL - Sample quantitation limit

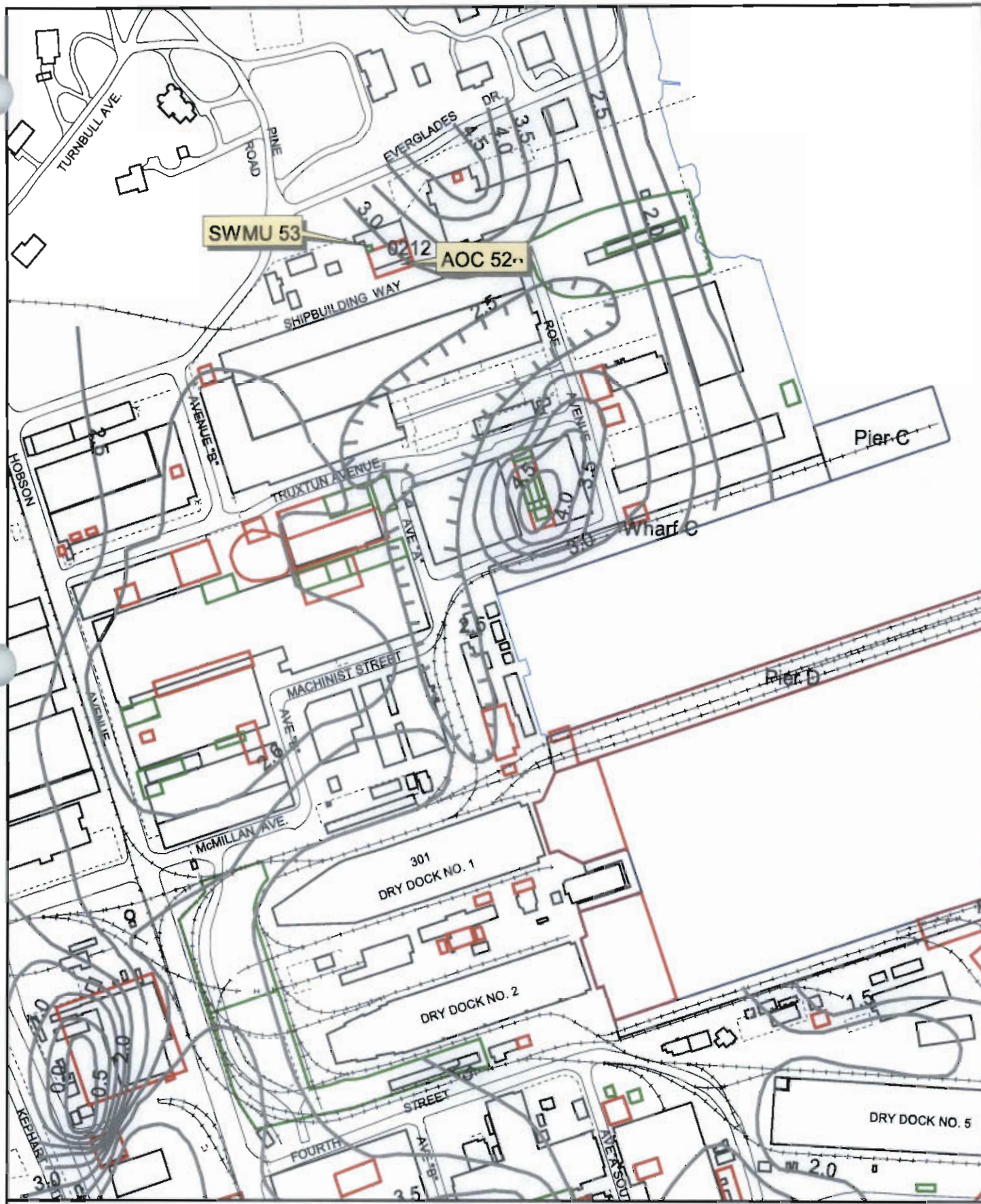
RBC - Risk-based concentration

NA - Not applicable

Table 10.5.D
Chemicals Present in Site Samples
SWMU 53; AOC 526 - Groundwater
NAVBASE - Charleston
Charleston, SC

Parameter		Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration		Units	Number Exceeding	
									Residential RBC	Reference		Res.	Ref.
Deep wells													
Inorganics													
Calcium (Ca)	N	1	1	89600	89600	89600	NA	NA	NA	NA	UG/L		
Magnesium (Mg)	N	1	1	12000	12000	12000	NA	NA	NA	NA	UG/L		
Manganese (Mn)		1	1	56.7	56.7	56.7	NA	NA	84	869	UG/L		
Shallow Wells													
Inorganics													
Aluminum (Al)		2	3	399	1110	754.5	25	25	3700	2810	UG/L		
Arsenic (As)		1	3	9.4	9.4	9.4	5	5	0.045	18.7	UG/L	1	
Calcium (Ca)	N	3	3	66600	151000	111866.7	NA	NA	NA	NA	UG/L		
Chromium (Cr)		1	3	2	2	2	1	1	18	12.3	UG/L		
Cobalt (Co)		1	3	2.2	2.2	2.2	2	2	220	2.5	UG/L		
Copper (Cu)		1	3	3.3	3.3	3.3	2	10	150	2.7	UG/L		1
Iron (Fe)	N	3	3	1180	9650	5640	NA	NA	1100	NA	UG/L		
Lead (Pb)		1	3	3.3	3.3	3.3	3	3	15	4.8	UG/L		
Magnesium (Mg)	N	3	3	6020	28000	20440	NA	NA	NA	NA	UG/L		
Manganese (Mn)		3	3	69.7	439	311.9	NA	NA	84	2560	UG/L	2	
Nickel (Ni)		1	3	2	2	2	1	1.5	73	15.2	UG/L		
Potassium (K)	N	3	3	15600	21400	18400	NA	NA	NA	NA	UG/L		
Volatile Organics													
1,2-Dichloroethene (total)		1	3	1	1	1	5	5	5.5	NA	UG/L		

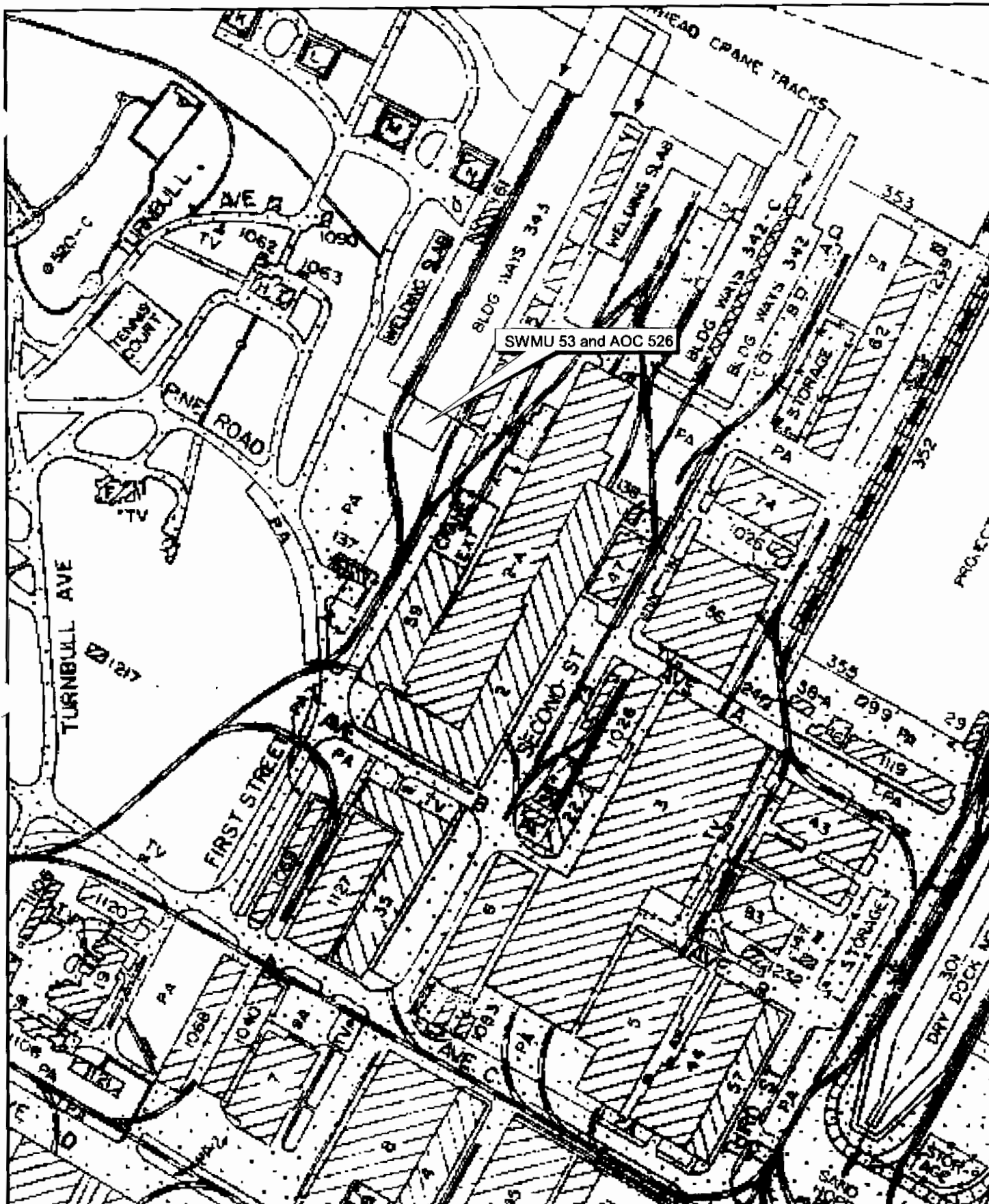
N - Essential Nutrient
UG/L - micrograms per liter
SQL - Sample quantitation limit



- Shallow Groundwater Contours ft bis
- Fence
- Railroads
- Roads
- AOC boundary
- SWMU boundary
- Buildings
- Zone boundary

N
 0 100 200 Feet
 1 inch = 93 feet

Figure A-1
 Shallow Groundwater Contour Map
 SWMU 53 and AOC 52, Zone E
 Charleston Naval Complex



 Railroad Line November 3, 1955



Figure B-1
 Historical Railroad Location Map
 SWMU 53 and AOC 526, Zone E
 Charleston Naval Complex

CH2MHILL TRANSMITTAL

To: Jerry Stamps
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste
Management
2600 Bull Street
Columbia, SC 29201

From: Dean Williamson/CH2M-Jones

Date: December 24, 2002

Re: CH2M-Jones' Responses to Comments by SCDHEC regarding *RFI Report Addendum, Solid Waste Management Unit 53/Area of Concern 526, Zone E (Revision 0)*

Quantity	Description
4	CH2M-Jones' Responses to Comments by SCDHEC regarding <i>RFI Report Addendum, Solid Waste Management Unit 53/Area of Concern 526, Zone E (Revision 0)</i> – Originally submitted on September 19, 2002

If material received is not as listed, please notify us at once

Remarks:

Copy To:

Gillbert Rennhack/SCDHEC, w/att
Mansour Malik/SCDHEC, w/att
Susan Byrd/SCDHEC, w/att
BCT Distribution List

SCDHEC Comments

Engineering Comment Prepared by Gilbert Rennhack

1. Please provide the analytical data of the thirteen (13) soil and five (5) groundwater sample locations for SWMU 53 and AOC 526.

CH2M Jones Response:

A review of the Zone E RFI Report, Revision 0 (EnSafe, 1997) indicated that the analytical data for the soil and groundwater samples at SWMU 53 and AOC 526 are included in Appendix H of the RFI Report. All data are also included in the CNC EGIS. An additional copy of the analytical results showing detected concentrations of analytes from the RFI for this site will be provided with the Revision 1 of this RFI Report Addendum.

Risk Assessment Comments Prepared by Susan Byrd

1. Section 5.0, COPC/COC Refinement, Pages 5-1 and 5-2:

BEQs detected in surface soil were originally screened against background and the industrial RBC in the 1997 RFI report. A comparison of the maximum detected BEQ concentration (2.218 mg/kg) against the residential RBC of 0.087 mg/kg, the industrial RBC of 0.78 mg/kg, and the CNC site-wide reference concentration of 1.40 mg/kg suggests that BEQ should be retained as a COPC. After the completion of risk calculation in the 1997 RFI, BEQ was determined to be a COC. According to the CNC Project Team Notebook, exposure point concentrations (UCL₉₅) can be used to eliminate COCs if the UCL₉₅ value is below the residential RBC. However, BEQ was eliminated as a COC based on a UCL₉₅ comparison to the CNC site-wide reference concentration. In order for the Department to make the proper risk management decisions for SWMUs 53 and 526, the risk to the human receptor under the anticipated land use scenario should be presented.

CH2M-Jones Response:

Similar to other Zone E sites, BEQs at SWMU 53 and AOC 526 will be retained as COCs for both the unrestricted and industrial land use scenarios, due to exceedance of background levels in surface and subsurface soils.

2. The level of BEQs detected in the subsurface soil sample collected at E053SB002 (10.6 mg/kg) was extremely higher than other concentrations of BEQ detected at SWMUs 53 and 526 as well as at the site-wide reference concentrations. Please provide information regarding a potential source of the subsurface contamination. No groundwater monitoring well is located at E053SB002, so a more thorough discussion of the potential migration of the subsurface contamination to groundwater is warranted.

CH2M-Jones Response:

The BEQ concentration in one subsurface soil at E053SB002 is elevated. Two monitoring wells, E053GW001 and E053GW002, are within 10 to 20 feet of this soil boring location. These two wells did not have detectable PAHs.

The Zone E RFI Report, Revision 0 (EnSafe, 1997) was reviewed by the Hydrogeology Department of SCHDEC, and the site data and potential leachability of BEQs were evaluated as part of this review process. There were no concerns from this review regarding a significant leaching concern.

The elevated PAHs are likely from asphalt material that is ubiquitous in this part of the Base, due to repeated digging and re-paving that could have resulted in mixing of the soils. The observed PAHs are similar to those detected elsewhere within Zone E. BEQs have been retained as COCs in soil at this site.

3. Please provide a more thorough explanation for disregarding the linkage of soil contamination to the storm sewer. The text merely states that there is no direct connection to the storm sewer, but no discussion of overland runoff to the sewer was provided in this section.

CH2M-Jones Response:

Soils investigated at this site remain under paved areas, thereby preventing contact with overland runoff that reaches storm drains. Therefore, there is currently no linkage to storm sewers from this site.

It should be noted that the Navy/EnSafe team is currently performing an evaluation of whether there is any contamination discharging from the storm sewers at the CNC. They have conducted wet weather sampling of stormwater and have analyzed the collected stormwater for a wide range of analytes. In the event that this evaluation indicates a discharge of significant contamination that may be related to this site, any potential linkage will be reassessed at that time.

These observations will be added to the text under Section 6.4.